

09990783

FILE 'CAPLUS' ENTERED AT 17:10:42 ON 16 JUL 2004  
L1 637 ("CARBON DIOXIDE" OR CO2) (S) ALKALINE (S) PH  
L2 41 L1 AND COLOR?  
L3 1 L2 AND RATE?  
L4 5 ("CARBON DIOXIDE" OR CO2) (S) ALKALINE (S) (PH (2A) INDICATOR?)  
L5 961 ("CARBON DIOXIDE" OR CO2) (S) (RATE (2A) EVOLUT?)  
L6 1 L5 AND (PH (2A) INDICATOR?)

L4 ANSWER 1 OF 5 CAPLUS COPYRIGHT 2004 ACS on STN  
ACCESSION NUMBER: 2002:392190 CAPLUS  
DOCUMENT NUMBER: 136:352284  
TITLE: *Microrespirometer and associated methods*  
INVENTOR(S): Hsieh, Yuch Ping; Hsieh, Yun-Hwa Peggy  
PATENT ASSIGNEE(S): USA  
SOURCE: U.S. Pat. Appl. Publ., 9 pp.

CODEN: USXXCO  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
PATENT NO. KIND DATE APPLICATION NO. DATE

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US 2002061596 A1 20020523 US 2001-990783 20011114  
PRIORITY APPLN. INFO.: US 2000-249771P P 20001117

AB A method for measuring an evolution rate of a gas from a sample includes equilibrating a sample with an alkaline solution and a pH indicator and permitting the alkaline solution to absorb formed carbon dioxide in an enclosed headspace. From the pH indicator at equilibrium is determined a time increment at which an increment of the alkaline solution is consumed by the CO2. Carbon dioxide evolution rate is calculated from the time increment, the volume increment, and the alkaline solution concentration. A device for performing this measurement includes a sample vial and a reaction chamber having an opening adapted for mating with a sample vial opening and an opening for receiving the solution. The reaction chamber is dimensioned for equilibrating the sample with the alkaline solution and for determining the time increment required for an increment of the alkaline solution to be consumed by CO2.

L4 ANSWER 2 OF 5 CAPLUS COPYRIGHT 2004 ACS on STN  
ACCESSION NUMBER: 1996:588758 CAPLUS  
DOCUMENT NUMBER: 125:237085  
TITLE: *A colorimetric device for indicating carbon dioxide*  
INVENTOR(S): Larsson, Anders; Oestberg, Gunilla; Krill, Paul;  
Gedeon, Andras  
PATENT ASSIGNEE(S): Icor Ab, Swed.  
SOURCE: PCT Int. Appl., 14 pp.  
CODEN: PIXXD2  
DOCUMENT TYPE: Patent

LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 1  
PATENT NO. KIND DATE APPLICATION NO. DATE  
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WO 9624054 A1 19960808 WO 1995-SE1363 19951116  
SE 9500400 A 19960804 SE 1995-400 19950203  
SE 504069 C2 19961028  
AU 9643579 A1 19960821 AU 1996-43579 19951116  
AU 695069 B2 19980806  
EP 807250 A1 19971119 EP 1995-942328 19951116  
JP 10513264 T2 19981215 JP 1995-523451 19951116  
PRIORITY APPLN. INFO.: SE 1995-400 19950203 WO 1995-SE1363  
19951116

AB A colorimetric device for indicating carbon dioxide is disclosed, which device contains; (a) at least one pH-sensitive indicator dye, (b) at least one basic substance selected from the group consisting of quaternary ammonium salts, phosphonium salts and sulfonium salts, and (c) at least one member selected from the group consisting of water-insol., organic substances of low volatility, which are not susceptible to alkaline hydrolysis and are liquid at room temperature or moderately elevated temps.

L4 ANSWER 3 OF 5 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1988:466084 CAPLUS

DOCUMENT NUMBER: 109:66084

TITLE: "Carbon dioxide indicator device"

INVENTOR(S): *Fehder, Carl G.*

PATENT ASSIGNEE(S): USA

SOURCE: U.S., 9 pp.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

PATENT NO. KIND DATE APPLICATION NO. DATE  
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US 4728499 A 19880301 US 1986-896360 19860813  
IN 172273 A 19930529 IN 1987-DE674 19870731  
FI 8703469 A 19880214 FI 1987-3469 19870810  
WO 8801384 A1 19880225 WO 1987-GB564 19870811  
HU 49718 A2 19891030 HU 1987-4197 19870811  
IL 83502 A1 19910916 IL 1987-83502 19870811  
DK 8704210 A 19880214 DK 1987-4210 19870812  
NO 8703390 A 19880215 NO 1987-3390 19870812  
AU 8776814 A1 19880218 AU 1987-76814 19870812  
CN 87105619 A 19880224 CN 1987-105619 19870812  
CN 1015665 B 19920226 EP 257916 A1 19880302 EP 1987-307121  
19870812 EP 257916 B1 19950111 JP 63075541 A2 19880405 JP 1987-202609  
19870812 ZA 8705948 A 19880427 ZA 1987-5948 19870812 CA 1322945 A1  
19931012 CA 1987-544371 19870812 ES 2066761 T3 19950316 ES 1987-307121

19870812 US 4994117 A 19910219 US 1988-175881 19880331 AU 8944621  
A1 19900308 AU 1989-44621 19891113 AU 634986 B2 19930311 US 5179002  
A 19930112 US 1991-696281 19910425 US 5166075 A 19921124 US 1992-  
873971 19920424 PRIORITY APPLN. INFO.: US 1986-896360 19860813  
WO 1987-GB564 19870811 US 1987-136600 19871222 US 1988-241298  
19880907

AB A combination rapid response device for detection of CO<sub>2</sub> in a gas mixture comprises an enclosure defined by walls and having a transparent window in 1 of the walls, an inlet, an outlet and atmospheric sealing means, the enclosure having mounted therein an indicator component positioned and arranged so as to be reviewed through the transparent window, the component comprising a carrier having fixedly attached thereto an indicating element formed from (1) an aqueous solution of a colorless compound which provides an alkaline solution; (2) a hygroscopic high-boiling transparent colorless H<sub>2</sub>O-miscible liquid; and (3) a chromogenic pH-sensitive indicator which changes color relative to a change in pH of the solution and which has a pK which is lower by 1.0-1.5 pH units than the pH of the solution, wherein the nature and concentration of the colorless compound in (1) is correlated to the nature and concentration of the indicator (3) so that no color change occurs for at least 15 min when the indicating element is exposed to an atmospheric having a concentration of 0.03% CO<sub>2</sub>, but a color change is produced within 5 to 20 s when the indicating element is exposed to an atmospheric containing <SYM179>2% CO<sub>2</sub>, the sealing means enclosing the device and being constructed so as to be opened immediately prior to use of the device. Application to correct placement of endotracheal catheters is indicated. A 0.003M aqueous solution of Ca(OH)<sub>2</sub> was prepared with pH 11.6-11.7. Metacresol purple Na salt was added so the indicator concentration was 0.12%. The resulting solution was applied to filter paper which was then dried. The impregnated paper was cut into strips and immediately used in the device or stored, being protected from prolonged exposure to the atmospheric in a sealed container under a N atmospheric or over soda-lime granules. When the strip was incorporated in this device, the device was packaged in a gas-impermeable metallic foil. The impregnated strip stayed purple for > 2 h in an atmospheric containing 0.03% CO<sub>2</sub>. Upon exposure to an atmospheric containing 5% CO<sub>2</sub>, the strip turned bright yellow within 3 to 5 s. In 2% CO<sub>2</sub>, the yellow color was achieved in 7 to 10 s.

L4 ANSWER 4 OF 5 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1975:415700 CAPLUS

DOCUMENT NUMBER: 83:15700

TITLE: Indicating completion of sterilization prosses

INVENTOR(S): Chapman, Arthur William

PATENT ASSIGNEE(S): UK

SOURCE: U.S., 3 pp.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

PATENT NO. KIND DATE APPLICATION NO. DATE

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US 3862824 A 19750128 US 1974-474609 19740530

PRIORITY APPLN. INFO.: US 1974-474609 19740530

AB Completion of sterilization is indicated by the use of a mixture deposited on the carrier consisting of a carboxylic acid which loses CO<sub>2</sub> under steam sterilizing conditions together with 1 of its salts which on exposure to steam produces alkali and causes a continuous change of the pH in the alkaline direction as exposure to steam continues, and a pH indicator deposited on the carrier which undergoes changes in color as the pH changes to indicate the extent of the exposure to steam which has occurred. Thus, to 7.7 g 2,4-dihydroxybenzoic acid [89-86-1] dissolved in 100 ml of industrial methylated spirit are added 30 ml of a saturated solution of Methyl red [493-52-7] in alc., 20 ml 0.5% solution Bromocresol green [76-60-8] in alc., and 12 ml of 0.5% solution of picric acid [88-89-1] in alc.; 16 ml of N aqueous NaOH is added to convert part of the 2,4-dihydroxybenzoic acid into its Na salt [26556-27-4]. This mixed solution is absorbed by filter paper and dried. The paper is bright red and pieces of it are sealed into transparent plastic envelopes (nylon) which are permeable to steam but retard penetration and prevent the material on the carrier from being washed away. When the indicator described above is heated in dry air at 120°, no visible change occurs in 4 hr; however, when exposed to steam at 120° in an autoclave, the decarboxylation takes place and is evidenced by change of color of the indicator which, after 5 min, becomes a light pink. After 10 min the pink color begins to disappear and a green color begins to appear; after 15 min the pink color has been displaced by the green color which, on further heating, slowly intensifies and becomes bluish green. After 1 hr the indicator has turned brownish green. In steam at 100° the change is slower and 2 hr or more are required before a green color is reached.

FILE 'CAPLUS' ENTERED AT 16:56:29 ON 18 JUL 2004

L1 37480 (ANALY? OR MEASUR? OR DEFIN? OR ESTIMAT? OR EVALUAT?  
OR DETERMIN? OR DETECT? OR MONITOR?)(3A)("CARBON DIOXIDE" OR  
CO2)

L2 2625 L1 AND EQUILIBR?

L3 47 L2 AND ("PH INDICATORE" OR COLOR?)

L4 58 L2 AND ("PH INDICATOR" OR COLOR?)

L5 7659 L1 AND (SOLUTION? OR LIQUID)

L6 989 L5 AND EQUILIBR?

L7 40 L6 AND ("PH INDICATOR" OR COLOR?)

L8 1600 L1 AND (ALKALINE OR NAOH OR "SODIUM HYDROXIDE" OR  
BACL OR "BARIUM CHLORIDE")

L9 188 L8 AND ("PH INDICATOR" OR COLOR?)

L10 9 L9 AND EQUILIBR?

L11 961 ("CARBON DIOXIDE" OR CO2) (S) (EVOLUT? (2A) RATE)

L12 1592 L1 AND (ALKALINE OR NAOH OR "SODIUM HYDROXIDE")

L13 39 L11 AND (ALKALINE OR NAOH OR "SODIUM HYDROXIDE")

L14 3 L13 AND EQUILIBR?

L4 ANSWER 5 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN  
ACCESSION NUMBER: 1999:803581 CAPLUS

DOCUMENT NUMBER: 132:157439  
TITLE: Characterization of pH in Liquid Mixtures of Methanol/H<sub>2</sub>O/CO<sub>2</sub>  
AUTHOR(S): Wen, Dong; Olesik, Susan V.  
CORPORATE SOURCE: Department of Chemistry, The Ohio State University,  
Columbus, OH, 43210, USA  
SOURCE: Analytical Chemistry (2000), 72(3), 475-480  
CODEN: ANCHAM; ISSN: 0003-2700  
PUBLISHER: American Chemical Society  
DOCUMENT TYPE: Journal  
LANGUAGE: English  
AB The presence of H<sub>2</sub>O and CO<sub>2</sub> in enhanced-fluidity liqs. changes the pH in these mixts. due to the formation of carbonic acid. The acid-base equilibrium in enhanced-fluidity liqs. will also be affected by the reduction in the dielec. constant with the addition of CO<sub>2</sub>. The pH of enhanced-fluidity liquid mixts. at room temperature was determined from the UV/visible absorption spectra of several pH indicators. pH values of methanol/H<sub>2</sub>O/CO<sub>2</sub> mixts. with CO<sub>2</sub> proportions <SYM163>19.2 mol % are reported. The effect of adding buffer to methanol/H<sub>2</sub>O/CO<sub>2</sub> mixts. on pH was also studied. Also pressure variation did not significantly influence the pH of enhanced-fluidity liqs.  
REFERENCE COUNT: 36

L4 ANSWER 6 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1999:359911 CAPLUS

DOCUMENT NUMBER: 131:239942

TITLE: "Blood gas monitoring using microflow colorimetry"

AUTHOR(S): Cooney, Christopher; Towe, Bruce C.

CORPORATE SOURCE: Bioeng. Program, Arizona State Univ., Tempe, AZ, USA

SOURCE: **Proceedings of SPIE-The International Society for Optical Engineering (1999), 3599(Optical Diagnostics of Biological Fluids IV), 110-116**

CODEN: PSISDG; ISSN: 0277-786X

PUBLISHER: SPIE-The International Society for Optical Engineering

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Optical monitoring of blood gas concns. is achieved using sub microliter quantities of a colorimetric indicator continuously perfused through microdialysis hollow fiber membranes in blood contact. The hollow fiber membranes, selected based on their permeabilities in blood, are silicone for both oxygen and carbon dioxide sensing, and cuproammonium rayon for pH sensing. A sweep fluid passed through the lumen of these fibers undergoes a diffusive equilibrium with the blood and then is continuously mixed with an indicator. A 450 nm gallium nitride LED is used to excite an oxygen-sensitive fluorophore, ruthenium tris(2,2'-bipyridyl) II dichloride, which has a 620 nm emission peak that is analyzed with an orange coated photodetector. Gallium phosphide 555 nm LEDs are used to excite the 550 nm absorbance peak of phenol red for pH measurement and phenol red in a 35 mM bicarbonate buffer for CO<sub>2</sub> measurement. Accurate measurement of small absorbance and fluorescence changes using small bore capillary tubes allows good resolution of biochem. concns. Continuous replenishment of the indicator by flow lends itself to a stable method of biochem. anal. that has potential for

long term performance. In vitro buffer studies demonstrate a resolution of  $\pm 0.5$  mmHg for pCO<sub>2</sub>, a  $\pm 1.5$  mmHg for pO<sub>2</sub>, and a  $\pm 0.003$  pH. REFERENCE COUNT: 4

L4 ANSWER 9 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1996:752208 CAPLUS

DOCUMENT NUMBER: 126:115250

TITLE: "Intravascular carbon dioxide monitoring using micro-flow colorimetry"

AUTHOR(S): Cooney, Christopher G.; Towe, Bruce C.

CORPORATE SOURCE: Dep. Chem., Arizona State Univ., Tempe, AZ,  
85287-6006, USA

SOURCE: **Biosensors & Bioelectronics (1996), Volume Date 1997, 12(1), 11-17**

CODEN: BBIOE4; ISSN: 0956-5663

PUBLISHER: Elsevier Advanced Technology

DOCUMENT TYPE: Journal

LANGUAGE: English

AB An intravascular carbon dioxide sensor is investigated which employs continuous perfusion of micro-quantities of reagent through silicone membrane tubing in contact with blood. Blood is sampled from a vessel by periodic withdrawal-reinfusion through a catheter and passes by the sensor membrane tubing integrated into the catheter system. Blood CO<sub>2</sub> equilibrates across the silicone membrane causing a color change in the reagent micro-flow stream that is detected by an optical cell external to the vessel. In vivo trials on pigs demonstrate a stable sensor response, a fast response time, and high signal-to-noise ratios. The sensor also exhibits an immunity to temperature changes, reduced intravascular blood flow, photobleaching, and leaching. It has a 2 min response time, a 2-mm Hg resolution, and minimal drift over a 12 h duration. Using a pig model, measured values compared with true values indicate a 0.998 correlation coefficient, a 1.3 mmHg precision, and a 1.7-mmHg bias. REFERENCE COUNT: 17

L4 ANSWER 12 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1995:853454 CAPLUS

DOCUMENT NUMBER: 123:295914

TITLE: "In situ measurements of seawater pCO<sub>2</sub>"

AUTHOR(S): DeGrandpre, M. D.; Hammar, T. R.; Smith, S. P.; Sayles, F. L.

CORPORATE SOURCE: Department of Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution, Woods Hole, MA, 02543, USA

SOURCE: Limnology and Oceanography (1995), 40(5), 969-75

CODEN: LIOCAH; ISSN: 0024-3590

PUBLISHER: American Society of Limnology and Oceanography, Inc.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB An instrument for studying seawater pCO<sub>2</sub> dynamics is described. The submersible autonomous moored instrument for CO<sub>2</sub> (SAMI-CO<sub>2</sub>) operates by equilibration of ambient seawater pCO<sub>2</sub> with a colorimetric pH indicator contained in a gas-permeable membrane. The indicator is periodically renewed to improve the stability and sensitivity typically reported for similar indicator-based pCO<sub>2</sub> sensors. The design combines off-the-shelf optical components, a miniature solenoid pump and valve, a low power data

logger, and a fiber-optic flow cell to achieve low power consumption and easy assembly. SAMI-CO<sub>2</sub> is designed to operate down to 100 m and contains sufficient batteries and reagent for deployment <SYM163>6 mo while making 48 measurements/day. Extensive in situ field tests were performed, including deployment in Woods Hole Harbor for >30 days. The field evaluation confirmed that SAMI-CO<sub>2</sub> is capable of measuring seawater pCO<sub>2</sub> with exceptional long-term stability (no detectable drift in 1 mo) and sensitivity comparable to ship-based equilibrator-IR methods ( $\pm 1$  <SYM109>atm). The time-series data from this study show that pCO<sub>2</sub> can be highly variable in nearshore environments with <SYM163>100 <SYM109>atm changes detected over a 4-h period. The structurally rich data highlight the need for continuous mooring-based measurements of pCO<sub>2</sub> for understanding C cycling in natural waters.

L4 ANSWER 23 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1984:120204 CAPLUS

DOCUMENT NUMBER: 100:120204

TITLE: Stopped-flow determination of carbon dioxide-diethanolamine reaction mechanism: kinetics of carbamate formation

AUTHOR(S): Barth, D.; Tondre, C.; Delpuech, J. J.

CORPORATE SOURCE: Lab. Chim. Phys. Org., Univ. Nancy 1, Vandoeuvre-les-Nancy, 54506, Fr.

SOURCE: International Journal of Chemical Kinetics (1983), 15(11), 1147-60

CODEN: IJCKBO; ISSN: 0538-8066

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The reaction mechanism of CO<sub>2</sub> with diethanolamine (DEA) is investigated using the stopped-flow method with optical detection in the ranges of concentration [DEA] = 0.111-8.4  $\times 10^{-2}$ M and [CO<sub>2</sub>] = 2.94-5.6  $\times 10^{-3}$ M. The comparison of the fast time-dependent light transmission change of a pH indicator with theor. simulations of integrated rate equations requires a kinetic model in which a simple carbamate formation takes place simultaneously with hydration reactions, whose contributions are far from being negligible. A first-order reaction relative to DEA is thus found with a rate constant for carbamate formation smaller than usually predicted ( $110 \pm 15$  M<sup>-1</sup> s<sup>-1</sup> at 25°). The equilibrium constant for the same reaction is also determined giving pK<sub>r</sub> = 5.3 at 25°, in satisfactory agreement with values assumed so far.

L4 ANSWER 24 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1983:466626 CAPLUS

DOCUMENT NUMBER: 99:66626

TITLE: The pH dependence of the hydration of carbon dioxide catalyzed by carbonic anhydrase III from skeletal muscle of the cat. Steady state and equilibrium studies

AUTHOR(S): Tu, Chingkuang; Sanyal, Gautam; Wynns, George C.; Silverman, David N.

CORPORATE SOURCE: Coll. Med., Univ. Florida, Gainesville, FL, 32610, USA

SOURCE: Journal of Biological Chemistry (1983), 258(14), 8867-71

CODEN: JBCHA3; ISSN: 0021-9258

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The pH dependence of the kinetics of CO<sub>2</sub> hydration catalyzed by carbonic anhydrase III from the skeletal muscle of the cat was measured. Two methods were used: an initial velocity study in which the change in absorbance of a pH indicator was measured in a stopped-flow spectrophotometer, and an equilibrium study in which the rate of exchange of <sup>18</sup>O between CO<sub>2</sub> and H<sub>2</sub>O was measured with a mass spectrometer. The steady state consts. for CO<sub>2</sub>, k<sub>cat</sub> and K<sub>m</sub>, were independent of pH within exptl. error in the range of pH 5.0-8.5; the rate of release from the enzyme of the O abstracted from substrate HCO<sub>3</sub><sup>-</sup> in the dehydration was also independent of pH in this range. This behavior was very different from that observed for carbonic anhydrase II for which k<sub>cat</sub> and the rate of release of substrate O were very pH-dependent. The rate of interconversion of CO<sub>2</sub> and HCO<sub>3</sub><sup>-</sup> at equilibrium catalyzed by carbonic anhydrase III was not altered when the solvent was changed from H<sub>2</sub>O to 98% D<sub>2</sub>O and 2% H<sub>2</sub>O. Thus, the interconversion probably proceeds without proton transfer in its rate-limiting steps, similar to isoenzymes I and II.

L4 ANSWER 26 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1983:30974 CAPLUS

DOCUMENT NUMBER: 98:30974

TITLE: "Apparatus and methods for measuring the acid-base status of blood"

INVENTOR(S): Zander, Rolf; Wolf, Hans Uwe

PATENT ASSIGNEE(S): Fed. Rep. Ger.

SOURCE: Ger. Offen., 24 pp.

CODEN: GWXXBX

DOCUMENT TYPE: Patent

LANGUAGE: German

PATENT NO. KIND DATE APPLICATION NO. DATE

DE 3113797	A1	19821021	DE 1981-3113797	19810406
DE 3113797	C2	19850131		
GB 2096767	A	19821020	GB 1982-9424	19820331
GB 2096767	B2	19850717		
FR 2503372	A1	19821008	FR 1982-5715	19820402
FR 2503372	B1	19850809		
<b>US 4454229</b>	A	19840612	US 1982-364665	19820402
CA 1183018	A1	19850226	CA 1982-400492	19820405
AU 8282399	A1	19821014	AU 1982-82399	19820406
AU 550069	B2	19860227		
JP 58005662	A2	19830113	JP 1982-56148	19820406
JP 02025464	B4	19900604		

PRIORITY APPLN. INFO.: DE 1981-3113797 19810406

AB Blood acid-base status is evaluated from the pH, pCO<sub>2</sub>, and base excess (BE). BE is determined from the pH value at a pCO<sub>2</sub> value of .apprx.0 mm Hg. Indicator solns. are described for these detns., and absorbents for CO<sub>2</sub> are provided for the title apparatus, which is a photometer with multiple measurement stations. Final calcs. are based on a known (pH-BE-Hb)-pCO<sub>2</sub> nomogram.



L4 ANSWER 27 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN  
ACCESSION NUMBER: 1981:29513 CAPLUS  
DOCUMENT NUMBER: 94:29513  
TITLE: Detection of carbon dioxide use during photosynthesis  
AUTHOR(S): Klob, Wolfgang  
CORPORATE SOURCE: Augsburg, 8900, Fed. Rep. Ger.  
SOURCE: Praxis der Naturwissenschaften, Biologie (1980), 29(10), 313-16  
CODEN: PNWBAV; ISSN: 0032-7050  
DOCUMENT TYPE: Journal  
LANGUAGE: German

AB The utilization of CO<sub>2</sub> by plant tissues during photosynthesis was demonstrated by pH changes in a bicarbonate solution in a closed system containing plant material. When the CO<sub>2</sub> in the air, the CO<sub>2</sub> in the solution, and the HCO<sub>3</sub><sup>-</sup> had reached equilibrium, exposure to light caused the plant to consume CO<sub>2</sub> from the air and consequently alter the pH of the solution Cresol red was used as a indicator of pH change. The color change was reversible in the dark, illustrating the production of CO<sub>2</sub> by plant respiration.

L4 ANSWER 30 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN  
ACCESSION NUMBER: 1969:467820 CAPLUS  
DOCUMENT NUMBER: 71:67820  
TITLE: Error sources in methods for determination of acid-base equilibrium  
AUTHOR(S): Zimmermann, Walter E.; Breithaupt B.  
CORPORATE SOURCE: Chir. Universitaetsklin, Freiburg/Br., Fed. Rep. Ger.  
SOURCE: Anaesthesiology and Resuscitation (1969), No. 35, 135-42  
CODEN: ANWIAN; ISSN: 0066-1341  
DOCUMENT TYPE: Journal  
LANGUAGE: German

AB The pCO<sub>2</sub> of blood samples was determined directly with a glass electrode and indirectly by manometric and colorimetric methods which are based on the Hasselbalch-Henderson equation. For blood from patients with an arterial pCO<sub>2</sub> of 25-45 mm. no significant differences were found. For blood from patients with a higher pCO<sub>2</sub> and also in certain pathol. cases significant differences were found. the errors in pCO<sub>2</sub> and in acid-base equilibrium detns. by indirect methods are due to the variable absorption coefficient <SYM97> of CO<sub>2</sub> in the equation as revealed by its different values for different blood samples, blood substitute solns., infusion solns., and mixts. thereof. The variation of <SYM97> as a function of the composition of the mixture is sometimes quite important and unexpected. Its importance for the therapy of acid-base disorders is discussed.

L4 ANSWER 32 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN  
ACCESSION NUMBER: 1966:45806 CAPLUS  
DOCUMENT NUMBER: 64:45806  
ORIGINAL REFERENCE NO.: 64:8626d-e  
TITLE: "Colorimetric determination of carbon dioxide exchange in field and laboratory"  
AUTHOR(S): Slavik, B.; Catsky, J.  
CORPORATE SOURCE: Ceskoslov Akad. Ved., Prague

SOURCE: Arid Zone Research (1965), 25, 291-8

CODEN: AZORAQ; ISSN: 0066-7366

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The method is based on the pH change of a solution of  $\text{NaHCO}_3$  after the latter has equilibrated with  $\text{CO}_2$  of the ambient air. Visual or photoelec. colorimetry was used to estimate the pH from color changes in indicators. The precision of the former method was  $\pm 0.02$  pH units, corresponding to  $\pm 5\%$  in the concentration of  $\text{CO}_2$ . The latter method was twice as accurate. 42 references.

L4 ANSWER 49 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1936:436 CAPLUS

DOCUMENT NUMBER: 30:436

ORIGINAL REFERENCE NO.: 30:50g-i,51a

TITLE: "The determination of carbon dioxide in air with a photocolormeter"

AUTHOR(S): Bycichin; Laska

SOURCE: Chemicke Listy pro Vedu a Prumysl (1935), 29, 201-2

CODEN: CLPRAN; ISSN: 0366-6832

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB A known volume of air previously washed with water was passed through a reagent in a glass cell standing between the photoelement of a Se cell colorimeter and a light source. The most satisfactory reagent was water containing  $1 + 10^{-4}$  g. mol.  $\text{NaHCO}_3$  and  $2 + 10^{-5}$  g. mol. dibromothymolsulfothalein per l. The equilibrium between the color tint and the partial pressure of  $\text{CO}_2$  in atmospheric (P) is given by the equation  $\text{bpH} = 3.94 - 0.85 \log P$  ( $18^\circ$ ), where bpH represents the pH determined colorimetrically and not corrected for the electrolytic content of the solution. The constant 3.94 was determined experimentally and is a function of the temperature and concentration of the substances in solution. The equation was correct for 0.03-0.30%  $\text{CO}_2$  in air by volume. The temperature, pressure, water content, and volume of the drawn air have no influence upon the results providing that a precision of not greater than 0.01 pH is sought. Theoretically, the reagent ought to serve for an unlimited number of detns.; actually, it must be changed in frequent intervals. Soot, tobacco smoke,  $\text{SO}_2$ ,  $\text{H}_2\text{S}$  and  $\text{NH}_3$  in the air are detrimental to the reagent, but all of these substances are removed by scrubbing with water. With a suitable apparatus the air can be analyzed for  $\text{CO}_2$  in 3 min. with an accuracy of 2-3% based on the quantity of  $\text{CO}_2$  present. For temperature other than  $18^\circ$  the volume of  $\text{CO}_2$  has to be corrected by increasing the bpH 0.004 for every  $1^\circ$  rise in temperature.

L4 ANSWER 50 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1933:59427 CAPLUS

DOCUMENT NUMBER: 27:59427

ORIGINAL REFERENCE NO.: 27:5358e-g

TITLE: The colorimetric estimation of the hydrogen-ion concentration of blood

AUTHOR(S): Myers, Victor C.; Muntwyler, Edward; Binns, Dorothy; Danielson, Wayne H.

SOURCE: Journal of Biological Chemistry (1933), 102, 19-28

CODEN: JBCHA3; ISSN: 0021-9258

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB A comparison has been made of the colorimetric pH values (pHe) at 20° and 38° and the H electrode values (pHe) obtained with unaltered plasma samples equilibrated at definite CO<sub>2</sub> tensions and on plasma samples altered to give variable protein concns. while a constant salt concentration is maintained in order to determine whether a discrepancy between the colorimetric and H electrode methods would occur with wide variations in protein concentration and pH such as occur in pathol samples of blood. With increasing CO<sub>2</sub> tensions (lowering of pH and increase in total CO<sub>2</sub>) the pHe<sub>20°</sub> to pHe<sub>38°</sub> correction was found to decrease and a decrease was also noticed with a decrease in the protein concentration in a given pH range. A comparison of 45 serum samples from hospital patients gave a higher correction, average 0.3 pH, than had previously been obtained for human plasma, in confirmation of the findings of Robinson, Price and Cullen. The correction pHe<sub>38°</sub> to pHe<sub>38°</sub> of Hastings obtained in this same series of samples averaged +0.03 pH. The variation was essentially the same as was obtained when the new colorimetric correction factor (0.3) for serum was employed.

L4 ANSWER 51 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1933:50376 CAPLUS

DOCUMENT NUMBER: 27:50376

ORIGINAL REFERENCE NO.: 27:4499f

TITLE: Determination of carbon dioxide in air

AUTHOR(S): Kauko, Y.

SOURCE: Acta Chem. Fennica (1932), 5B, 54

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB For constant concentration of basic ions, the total concentration of CO<sub>2</sub>, H<sub>2</sub>CO<sub>3</sub>, HCO<sub>3</sub><sup>-</sup> and CO<sub>3</sub><sup>--</sup> in the system: base-CO<sub>2</sub>-H<sub>2</sub>O is, over a considerable range, almost independent of the pH. When the CO<sub>2</sub> partial pressure is altered, equilibrium is attained very rapidly, and as a consequence the CO<sub>2</sub> content of air can be determined potentiometrically or colorimetrically (±0.0003%) within about 2 min.

L4 ANSWER 52 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1932:57432 CAPLUS

DOCUMENT NUMBER: 26:57432

ORIGINAL REFERENCE NO.: 26:5872c-e

TITLE: Determination of carbon dioxide in gas mixtures. A potentiometric method

AUTHOR(S): Wilson, P. W.; Orcutt, F. S.; Peterson, W. H.

SOURCE: Industrial and Engineering Chemistry, Analytical Edition (1932), 4, 357-61

CODEN: IENAAD; ISSN: 0096-4484

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB If a dilute solution of NaHCO<sub>3</sub> is brought into equilibrium with an atmospheric containing CO<sub>2</sub>, the final pH of the solution measures the CO<sub>2</sub> in the atmospheric and is

independent of the volume of gas passed through the solution or the volume of solution. The method described, which is accurate to 0.02 pH, was developed to measure low percentages (0.03-7%) of CO<sub>2</sub> in gas mixts., as those used in greenhouses. It consists in bubbling the gas through about 10 cc. of standard, dilute NaHCO<sub>3</sub> and determining the resulting pH with the glass electrode and a vacuum tube potentiometer. The final determination can also be made, though less satisfactorily, by means of a pH colorimeter.

L4 ANSWER 53 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1928:3830 CAPLUS

DOCUMENT NUMBER: 22:3830

ORIGINAL REFERENCE NO.: 22:471i,472a-c

TITLE: A simple colorimetric method for field determinations of the carbon dioxide tension and free carbon dioxide, bicarbonates and carbonates in solution in natural waters. II. A critical mathematical analysis of theory and data

AUTHOR(S): Powers, E. B.; Bond, J. D.

SOURCE: Ecology (1927), 8, 471-9

CODEN: ECOLAR; ISSN: 0012-9658

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB cf. C. A. 21, 3242. The assumption is made that all active substances of homogeneous and heterogeneous equilibria come to a point of equilibrium, provided time is afforded. The assumption is also made that in a homogeneous and in all heterogeneous equilibria the points of equilibria for all active species are determined by the CO<sub>2</sub> tension of the system, provided the CO<sub>2</sub> tension is the only modifying factor. It is assumed that the CH unless entirely stabilized by a strong acid increases or decreases with the increase or decrease of the CO<sub>2</sub> tension. This can be expressed by the equation  $CH = (K_{\text{gas}} P)^n$ , where  $K_{\text{gas}} P$  is the solubility product of H<sub>2</sub>CO<sub>3</sub>, and  $n$  an expression denoting the power of the rate of increase of the CH. The equation  $CH = (K_{\text{gas}} P)^n$  is the mathematical power law representing the relation of the CH to the CO<sub>2</sub> tension of all equilibria. The equation reduces to a linear form  $\log CH = n \log (K_{\text{gas}} P)$  when the logarithms of both numbers are taken. The pH is the negative of the log CH. This being true, the pH readings with a change of sign can be taken as the log CH. By use of this equation the CO<sub>2</sub> tensions of natural waters can be determined, provided the pH and the value of  $n$  are known, and provided none of the constituents or the phys. properties of the water are being modified or are undergoing changes other than those brought about through modifications in the CO<sub>2</sub> tension of the water. When data of samples of water at various CO<sub>2</sub> tensions are analyzed in the light of this formula, it is found that they approach very closely the linear form. This method can perhaps also be utilized in determining the chemical behavior of natural water.

L4 ANSWER 54 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1926:29335 CAPLUS

DOCUMENT NUMBER: 20:29335

ORIGINAL REFERENCE NO.: 20:3613f-h

TITLE: The carbon-dioxide content of distilled water and its determination

AUTHOR(S): Kolthoff, I. M.

SOURCE: Chemisch Weekblad (1926), 23, 381-4

CODEN: CHWEAP; ISSN: 0009-2932

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB For titration of CO<sub>2</sub> as a monobasic acid the endpoint is reached after complete conversion into HCO<sub>3</sub><sup>-</sup>. The corresponding pH for a very dilute NaHCO<sub>4</sub> solution was calculated to be 7.84 for 10<sup>-5</sup> M, 7.95 for 2.10<sup>-5</sup> M, 8.3 for 10<sup>-4</sup> M. A further error in the determination, due to alkali-binding power of the indicator, has to be corrected by proper neutralization of the latter. K. uses phenol red dissolved 100 mg. in 4.5 cc. 0.1 N alkali and fills up to 100 cc. with water. One cc. of this solution to 1 l. water will give a pH of 8. For the CO<sub>2</sub> determination 1 to 1.3 l. water in a Jena-glass flask, filled up to the top, 1 cc. indicator added, is titrated with 0.01 N Na<sub>2</sub>CO<sub>3</sub> until the red-violet color remains for 5 min. Between each addition the flask is closed and shaken. For the CO<sub>2</sub> content of distilled water values up to 2.4 + 10<sup>-4</sup> M were found, after air was passed through for 10 hrs. the value became 1.55 + 10<sup>-5</sup> M (by simple standing it took a week to reach equilibrium), the theoretical value is 1.5 + 10<sup>-5</sup> M. The method may be used for the determination of CO<sub>2</sub> in air.

L4 ANSWER 55 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1925:8421 CAPLUS

DOCUMENT NUMBER: 19:8421

ORIGINAL REFERENCE NO.: 19:1148c-d

TITLE: Acid-basic equilibrium. III. Method for determining alveolar carbon dioxide tension

AUTHOR(S): Hollo, J.; Weiss, St.

SOURCE: Magyar Orvosi Archivum (1924), 25, 301-6

CODEN: MGOAA8; ISSN: 0368-9948

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB The air is made to pass into a solution of NaHCO<sub>3</sub> where it is physically absorbed in a measure corresponding to the tension in the alveoli and thereby changes the reaction of the NaHCO<sub>3</sub> solution. The latter is detd. by aid of a Hellige colorimeter, according to the principle of Michaelis and Gy. acte.em. acte.ant. An empirical curve contains the tensions which correspond to the colorimeter readings.

L4 ANSWER 56 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1922:15466 CAPLUS

DOCUMENT NUMBER: 16:15466

ORIGINAL REFERENCE NO.: 16:2701a-c

TITLE: A comparison of colorimetric and electrometric determinations of hydrogen concentrations in solutions containing carbon dioxide

AUTHOR(S): Cullen, G. E.; Hastings, A. B.

SOURCE: Journal of Biological Chemistry (1922), 52, 517-20

CODEN: JBCHA3; ISSN: 0021-9258

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB C. and H. standardized the system containing the calomel electrode against a standard phosphate solution of  $\text{PH} = 7.4$  and then used this value in calculating the  $\text{PH}$  of solns. containing  $\text{NaHCO}_3$ , equilibrated with  $\text{CO}_2$  at different tensions. The same solns. were used for colorimetric detns. of  $\text{PH}$  by the method described in the preceding abstract, except that they were not diluted with  $\text{NaCl}$  solution and identical results were obtained over the range from  $\text{PH} = 7.27$  to  $7.70$ . The claim of Evans (C. A. 15, 2461) that the electrometric method gives too acid values with solns. containing  $\text{CO}_2$  could not be confirmed.

L4 ANSWER 58 OF 58 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1917:11310 CAPLUS

DOCUMENT NUMBER: 11:11310

ORIGINAL REFERENCE NO.: 11:2337d-i

TITLE: The standardization of a new colorimetric method for the determination of the hydrogen ion concentration, carbon dioxide tension, and carbon dioxide and oxygen of sea water, of animal heat, and of carbon dioxide of the air, with a summary of similar data on bicarbonate solutions in general

AUTHOR(S): McClendon, J. F.

CORPORATE SOURCE: Univ. Minn.

SOURCE: Journal of Biological Chemistry (1917), 30, 265-88

CODEN: JBCHA3; ISSN: 0021-9258

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB Description of an apparatus for the determination of the  $\text{H}^+$  concentration ( $\text{CH}$ ) with the  $\text{H}$  electrode at any desired  $\text{CO}_2$  tension. It consists of an electrode chamber, a gas-mixing chamber and suitable connections and accessories. The titration alkalinity, or alkaline reserve, of sea water was determined by titrating 100 cc. while boiling in an Erlenmeyer flask of resistance glass with 0.01 N  $\text{HCl}$ , using dibromo-o-cresolsulfophthalein as indicator. Total  $\text{CO}_2$  was determined with a modified Van Slyke apparatus (cf. preceding abstract). Charts were plotted of the  $\text{CH}$  against the log of the  $\text{CO}_2$  tension and of the  $\text{CH}$  against the total  $\text{CO}_2$ , all at  $20^\circ$ . On the former of these, curves were plotted from the experimentally determined  $\text{CH}$  of  $\text{NaHCO}_3$  solns. of various concns., sea water and normal human blood at various  $\text{CO}_2$  tensions, at  $20^\circ$ . With the aid of these curves, and a correction for temperature ( $1^\circ =$  a change of  $\text{CH}$  of 10-0.01), it is possible to determine the  $\text{CO}_2$  tension of any of these solns. from the  $\text{CH}$  and the temperature. On the second chart were drawn curves representing the total  $\text{CO}_2$  corresponding to a given  $\text{CH}$  for sea waters of certain titration alkalinities (expressed in terms of cc. of 0.1 N  $\text{HCl}$  required to titrate 1 l. of boiling sea water). From these curves the total  $\text{CO}_2$  of sea water may be determined from the  $\text{CH}$  and the alkaline reserve. Since the  $\text{O}_2$  in sea water varies inversely with the  $\text{CO}_2$ , the chart may also be used for an approx. determination of the  $\text{O}_2$  content of sea water. Assuming the respiratory quotient of marine animals to be nearly 1, it is also possible to approximate the rise in temperature in a given quantity of sea water caused by a change in  $\text{CO}_2$  content. The  $\text{CO}_2$  content of air is that of sea water that has been brought into equilibrium with it, and the latter, as has already been stated, may be determined from the  $\text{CH}$  and the temperature. In order to make these methods applicable for use on shipboard or in poorly

equipped laboratories, McC. has devised a series of buffer-indicator solns. for determining the CH. The solns. contain (1) 18.6 g. boric acid and 22.5 g. NaCl per l.; (2) 28.67 g. borax and 19.0 g. NaCl per l. The indicators used are thymol-, o-cresol- and naphtholsulfophthalein.

L10 ANSWER 4 OF 9 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1963:424586 CAPLUS

DOCUMENT NUMBER: 59:24586

ORIGINAL REFERENCE NO.: 59:4471h,4472a-b

TITLE: A portable conductometric apparatus for determining carbon monoxide in air

AUTHOR(S): Vol'berg, N. Sh.

SOURCE: Novoe v Oblasti Sanit.Khim. Analiza, ( Raboty po Prom.-Sanit. Khim.) (1962) 195-203

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB An apparatus for determining CO in air consists of a 500-ml. gas pipet; a series of absorbers, filled with Hg(OAc)<sub>2</sub> on silica gel for absorbing unsatd. hydrocarbons, with the chemical adsorbent KhP-I for acid gases and compds., with silica gel indicator for H<sub>2</sub>O, NH<sub>3</sub>, amines, and other basic impurities (indicating exhaustion by change of color), and with ascarite for remaining CO<sub>2</sub> traces; an oxidation unit, containing I<sub>2</sub>O on fire brick for oxidation of CO to CO<sub>2</sub>; an absorption-measuring cell; and the conductometric circuitry, including a comparison cell. The apparatus is cleaned with purified air. Air flow is 100 ml./min.; CO<sub>2</sub> (from oxidized CO), is absorbed in 0.005N NaOH containing 0.1% BuOH, which decreases the diameter of bubbles, eliminates foam, and is essential for correct readings. Readings are taken after temperature equilibrium is reached (approx. 6 min.) Sep. circuits for the absorption-conductometric, and for the comparison cell are used; constant resistances, placed after the cells, represent 150% of their resistance and ensure the linearity of measurements, deviations being <SYM163>2%. Sensitivity can be varied over a 50-fold range. The microammeter M-132, with a full scale of 10 microamp., represents approx. 1% of the complete resistance of the cell. Results for 0.007-0.057 mg. CO/l. air agree well with those obtained by titration. Work time is approx. 15 min.

L10 ANSWER 5 OF 9 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1959:98894 CAPLUS

DOCUMENT NUMBER: 53:98894

ORIGINAL REFERENCE NO.: 53:17784f-i

TITLE: Some methodological questions of geochemical hydrocarbon researches

AUTHOR(S): Bergh, Arpad; Stegena, Lajos

SOURCE: Geofiz. Kozlemenyek (1956), 5(No. 4), 21-9

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB To eliminate the inaccuracies caused by a dead air space in conventional underground gas sampling equipment, it was recommended to fill the part of the sonde between the lower perforated section and drill hole with washed quartz sand. This procedure requires the discarding of the 1st sample only (instead of the 1st 2) before the

final sample can be taken. Samples taken by this method will also better represent the equilibrium condition of the gas, as less air will replace part of it than when 2 samples are drawn prior to the drawing of the final sample. To determine the CO<sub>2</sub> content of the samples (approx. 0.001%) a method was developed whereby the sample is bubbled through a phenolphthalein-containing NaOH solution. The CO<sub>2</sub> will react with part of the NaOH, and the resulting alkalinity decrease is measured by determining the loss of color intensity of the solution. Organic gases are determined by a passage of the exhaust gases from the bubbler through a device where they are oxidized to CO<sub>2</sub> over an incandescent Pt wire, followed by a determination as previously described. Calibration of the equipment was carried out with mixts. of air of known CO<sub>2</sub> content and N. The chemical reactions occurring during the determination were studied, and it was found that optimum results are obtained if the initial NaOH concentration (I) and the initial phenolphthalein concentration (II) is identical. If I < II the colloiddally precipitating phenolphthalein will cause wrong extinction readings. A determination by this procedure takes 20-5 min. The method was not found practicable for use in the field.

L10 ANSWER 7 OF 9 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1943:6704 CAPLUS

DOCUMENT NUMBER: 37:6704

ORIGINAL REFERENCE NO.: 37:1136g-i,1137a-c

TITLE: Photochemical reoxidation of carbon monoxide and water to carbon dioxide and hydrogen

AUTHOR(S): Seitz, W.

SOURCE: Biochemische Zeitschrift (1941), 308, 103-8

CODEN: BIZEA2; ISSN: 0366-0753

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB The increase in O<sub>2</sub> consumption in biol. expts. when CO is used under conditions of illumination is generally attributed to the dissociation of the CO-ferrous compound of the red respiratory enzyme. It is pointed out that the activating effect of light can depend also on the purely chemical reaction:  $\text{CO} + \text{H}_2\text{O} \xrightarrow{\text{SYM174}} \text{CO}_2 + \text{H}_2 + 10 \text{ Cal.}$  CO dissolved in H<sub>2</sub>O can be oxidized to CO<sub>2</sub> by illumination in the presence of a H acceptor. This reaction can be followed by the decolorization of methylene blue. If the CO<sub>2</sub> is absorbed, the reaction equilibrium can be shifted much more to the right. The expts. were carried out in Thunberg tubes. The tubes were illuminated with a 1000-w. bulb at 50 cm. distance, the temperature never rising above 30°. By using photosensitizers or catalysts (adrenaline) and low H-acceptor concns. the decolorization can be observed even with diffuse daylight. Twenty oxidation-reduction indicator dyes (described previously in C. A. 32, 8926.2) were tested: the acid indicators dichlorophenol-indophenol, cyanine, indigosulfonic acid, and the basic indicators Toluylene Blue chloride, Cresyl Blue chloride, thionine, Capri Blue, Janus Green, which can all be reduced. The acid indicators must be buffered because in pure water they can be hydrogenated only in the presence of a photosensitizer (10 <SYM103> eosin). Formaldehyde, formate, ferrous, ferric, cuprous and cupric ions have no influence on the reaction. The reaction velocity at 30° is only slightly greater than at 5°. Even in the absence of CO small amts. of methylene blue are decolorized in light (not in the dark) at



an alkaline reaction. The oxidation-reduction dyes act as H acceptors and not as photosensitizers since even colorless oxidation-reduction systems (adrenaline, dehydroascorbic acid) catalyze the reaction. Also strongly neg. indicators like Neutral Red (Eh at pH 7.0 = -0.370 e. v.) or phenosafranine (-0.525 e. v.) are decolorized. In an alkaline medium the reaction proceeds more rapidly and an oxidation-reduction system is not required. When a saturated CO solution in 0.0025 N NaOH is illuminated it is possible to determine the CO<sub>2</sub> formed titrimetrically. In stronger alkali the oxidation of CO to CO<sub>2</sub> proceeds even in the dark.

FILE 'CAPLUS' ENTERED AT 17:20:19 ON 19 JUL 2004

L1 4 ("CARBON DIOXIDE" OR CO<sub>2</sub>) (S) HEADSPACE (S) TITRAT?  
L2 13 ("CARBON DIOXIDE" OR CO<sub>2</sub>) AND HEADSPACE AND TITRAT?  
L3 1444 ("CARBON DIOXIDE" OR CO<sub>2</sub>) AND (COLOR? OR "PH INDICATOR")  
AND TITRAT?  
L4 165 ("CARBON DIOXIDE" OR CO<sub>2</sub>)(S) (COLOR? OR "PH INDICATOR") (S)  
TITRAT?  
L5 16 L4 AND (EVOLUT? OR RESPIR?)

L2 ANSWER 4 OF 13 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 2000:147892 CAPLUS

DOCUMENT NUMBER: 132:278415

TITLE: Changes in aroma quality of "Golden Delicious" apples after storage at different oxygen and carbon dioxide concentrations

AUTHOR(S): Lopez, M. L.; Lavilla, M. T.; Recasens, I.; Graell, J.; Vendrell, M.

CORPORATE SOURCE: CeRTA, UDL-IRTA, Lleida, E-25198, Spain

SOURCE: Journal of the Science of Food and Agriculture (2000), 80(3), 311-324

CODEN: JSFAAE; ISSN: 0022-5142

PUBLISHER: John Wiley & Sons Ltd.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB "Golden Delicious" apples were stored in semicommercial chambers in normal atmospheric and in various controlled atmospheres (CAs) in which oxygen and carbon dioxide contents were held at 10, 20 or 30 lm<sup>-3</sup> for 3, 5 or 7 mo. Following storage, fruits were kept at 20°C for 1, 5 or 10 days, after which quality parameters were determined and aroma components were obtained and analyzed by the dynamic headspace method and quantified by gas chromatog.-mass spectrometry. The highest emission of volatile components was obtained after 5 mo of storage. Esters were the main compds. released after cold storage in all conditions. Normal cold storage gave the highest amts. of straight-chain esters, while low-oxygen atmospheres gave the highest amts. of branched-chain esters. After 3 and 7 mo there were no significant differences in volatiles on comparing fruits from different storage conditions. Low-oxygen atmospheres had beneficial effects on fruit firmness, titratable acidity and color. Apples coming from low-oxygen atmospheres gave the highest sensory score after 5 mo of cold storage. REFERENCE COUNT: 36

L2 ANSWER 5 OF 13 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 2000:121465 CAPLUS

DOCUMENT NUMBER: 132:156307

TITLE: "Equilibrium vapor method to determine the concentration of inorganic carbon and other compounds in water samples"

AUTHOR(S): *Baker, Ronald J.; Baehr, Arthur L.; Lahvis, Matthew A.*

CORPORATE SOURCE: USA

SOURCE: **Water-Resources Investigations Report (United States Geological Survey) (1999), 99-4018C, U.S. Geological Survey Toxic Substances Hydrology Program, 1999, Vol. 3, 103-112**

CODEN: WIREFS

DOCUMENT TYPE: Report

LANGUAGE: English

AB The total concns. of dissolved carbon dioxide, bicarbonate, and carbonate (CT) in water is a fundamental parameter in studies of natural and contaminated systems. A new method (the equilibrium vapor method) for determining CT that involves the measurement of carbon dioxide concentration in the head space of a water sample by gas chromatog. and calcn. of CT by using the equilibrium relations of the carbonate system is presented. The method is most accurate when samples pH is low (near the alkalinity titration endpoint, about 4.3) when the standard titration method is least accurate or inapplicable. The method is also advantageous over the standard titration method when the water contains other alkaline species, such as salt organic acids, which can occur as metabolites of microbial activity. The presence of such species can results in overestimation of CT with the standard titration method because they contribute to alkalinity. An addnl. advantage of the equilibrium vapor methods is that aqueous concns. of volatile compds., such as hydrocarbons, methyl-tert-Bu ether (MTBE), and dissolved gases, such as oxygen, nitrogen, methane, and carbon disulfide, can be calculated from the headspace anal. of a single sample by using Henry's law. Groundwater samples from two gasoline-spill sites were analyzed to demonstrate the method and compare the results with those obtained by using the standard titration method. The two methods provided comparable ests. of CT for samples with pH values above 5.0. For low-pH samples, CT was obtainable only with equilibrium vapor method. Filtration and acidification of samples did not affect the accuracy of the equilibrium vapor method for samples from these sites; however, acidification of samples from sites with significant amts. of carbonate minerals may result in overestimation of CT. The concns. of gasoline hydrocarbon in several samples also were determined. REFERENCE COUNT: 8

L2 ANSWER 6 OF 13 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1998:333010 CAPLUS

DOCUMENT NUMBER: 129:19411

TITLE: "Accurate headspace analysis of fCO<sub>2</sub> in discrete water samples using batch equilibration"

AUTHOR(S): *Neill, Craig; Johnson, Kenneth M.; Lewis, Ernie; Wallace, Douglas W. R.*

CORPORATE SOURCE: Department of Applied Science, Brookhaven National Laboratory, Upton, NY, 11973-5000, USA

SOURCE: **Limnology and Oceanography (1997), 42(8), 1774-1783**

CODEN: LIOCAH; ISSN: 0024-3590

PUBLISHER: American Society of Limnology and Oceanography

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A high-accuracy, batch-equilibration, static-headspace technique for the determination of the fugacity of CO<sub>2</sub> (fCO<sub>2</sub>) in discrete water samples is described. The technique was designed for monitoring small changes of CO<sub>2</sub> in the ocean and has accuracy and precision (<1% for water samples) comparable to that of the best techniques available. The method uses several approaches to maximize accuracy, requires only a small water sample (60 mL), and is very rapid (.apprx.2 min/anal.). Precision of the calculated total alkalinity, based on the measured fCO<sub>2</sub> and C<SYM116>, is comparable to or better than is generally attained using potentiometric titration. Compared with C<SYM116> and total alkalinity measurements, the small sample volume and rapid anal. time makes it practical to perform anal. of multiple replicates in order to improve confidence in the result. The method is readily applicable to exptl. studies such as incubations as well as to time-series measurements of in situ biol. metabolism. Because the anal. uses gas chromatog., the technique can be adapted to measure simultaneously a suite of gases dissolved in seawater. REFERENCE COUNT: 24

L2 ANSWER 8 OF 13 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1995:438897 CAPLUS

DOCUMENT NUMBER: 122:273550

TITLE: A method for measuring free CO<sub>2</sub> in upland streamwater using headspace analysis

AUTHOR(S): Hope, Diane; Dawson, Julian J.C.; Cresser, Malcolm S.; Billett, Michael F.

CORPORATE SOURCE: Department of Plant & Soil Science, University of Aberdeen, Aberdeen, AB9 2UD, UK

SOURCE: Journal of Hydrology (Amsterdam, Netherlands) (1995), 168(1-2), 1-14

CODEN: JHYDA7; ISSN: 0022-1694

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A headspace anal. method is described to minimize CO<sub>2</sub> loss and provide a more direct technique for determining free CO<sub>2</sub> in low ionic strength, organic-rich upland streamwaters. A sample of streamwater is collected in a sealed flask and a headspace is created by pumping out a known volume of sample, replacing it with CO<sub>2</sub>-scrubbed air. After equilibration of CO<sub>2</sub> between the remaining water and the headspace, the concentration of CO<sub>2</sub> in the headspace is measured using an IR gas analyzer. The concentration of free CO<sub>2</sub> in the original sample is then calculated using Henry's law. This method measured free CO<sub>2</sub> in standard solns. containing 1-10 mg/L free CO<sub>2</sub> to within 0.1 mg/L. The method was used to measure free CO<sub>2</sub> in streamwater from 19 sites on the River Dee in north-east Scotland and the results were compared with those reported for streams elsewhere. Free CO<sub>2</sub> concns. measured by headspace anal. were significantly higher than those found using acidimetric titration.

L2 ANSWER 9 OF 13 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1994:552580 CAPLUS

DOCUMENT NUMBER: 121:152580

TITLE: Determination of dissolved carbon dioxide by coulometric titration in modified atmosphere systems

AUTHOR(S): Loewenadler, Jenny; Roenner, U.

CORPORATE SOURCE: SIK, Swed. Inst. Food Res., Goeteborg, S-402 29, Swed.

SOURCE: Letters in Applied Microbiology (1994), 18(5), 285-8

CODEN: LAMIE7; ISSN: 0266-8254

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The solubility of CO<sub>2</sub> in microbiol. media at different pH values, water activities (<SYM97>w), temps., buffering capacities and ratios of headspace to media vols. was determined by using a coulometer. Buffering capacity and ratio of headspace to media volume were shown to be the major factors influencing the solubility of CO<sub>2</sub> in modified atmospheric model systems. The growth inhibitory effects of different dissolved CO<sub>2</sub> concns. (0-50 <SYM109>mol mL<sup>-1</sup>) were determined for *Pseudomonas fragi* at 8°C and 22°C. *P. fragi* was shown to be strongly affected by the CO<sub>2</sub> concentration in the media. A CO<sub>2</sub> concentration of 40 <SYM109>mol mL<sup>-1</sup> was needed to inhibit *P. fragi* at 8°C. The importance of measuring dissolved CO<sub>2</sub> concns. in modified atmospheric packaging applications was shown and the coulometer proved to be an excellent tool for this purpose.

L2 ANSWER 10 OF 13 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1994:417220 CAPLUS

DOCUMENT NUMBER: 121:17220

TITLE: Complexation of carbonate species at the goethite surface: implications for adsorption of metal ions in natural waters

AUTHOR(S): van Geen, Alexander; Robertson, Alexander P.; Leckie, James O.

CORPORATE SOURCE: Dep. Civ. Eng., Stanford Univ., Stanford, CA, 94305, USA

SOURCE: Geochimica et Cosmochimica Acta (1994), 58(9), 2073-86

CODEN: GCACAK; ISSN: 0016-7037

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Headspace PCO<sub>2</sub> was measured with an IR gas analyzer over an equilibrated goethite suspension to determine adsorption of carbonate species in the pH range 3 to 8. For a 2 g/L goethite suspension in 0.1N NaClO<sub>4</sub> (apprx. 3 · 10<sup>-4</sup> M surface sites), the fraction of carbonate species adsorbed increased from 0.15 at pH 3 to a maximum of 0.56 at pH 6. In 0.01N NaClO<sub>4</sub>, the fraction of carbonate species adsorbed at pH 6 increased to 0.67. The total concentration of CO<sub>2</sub> in the suspension increased from about 0.4 to 0.6 · 10<sup>-4</sup> M in the pH range of these expts. The development of surface charge at the goethite surface was determined in the pH range 4 to 11 by potentiometric titration under controlled low CO<sub>2</sub> conditions. No hysteresis was observed between the acid and base legs of titrns. in 0.10, 0.03, and 0.01N NaClO<sub>4</sub> resulting in a pH<sub>pzc</sub> of 8.9. The carbonate species adsorption data were modelled using the least squares optimization program FITEQL for the diffuse double-layer model and the triple-layer model using

stoichiometries of the type Fe-OCOOH and Fe-OCOO- for surface bound carbonate species. The model results are consistent with sep. expts. showing a significant reduction in chromate adsorption on goethite as the partial pressure of CO<sub>2</sub> was increased from <5 to 450 and 40,000 <SYM109>atmospheric. The data suggest that mineral oxide surface sites which control solid/solute partitioning of metal ions in natural systems may be largely bound to adsorbed carbonate species.

L2 ANSWER 11 OF 13 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1991:678265 CAPLUS

DOCUMENT NUMBER: 115:278265

TITLE: An enzymic assay for carbon dioxide in cheese

AUTHOR(S): Crow, Vaughan L.; Martley, Francis G.

CORPORATE SOURCE: New Zealand Dairy Res. Inst., Palmerston North, N. Z.

SOURCE: Journal of Dairy Research (1991), 58(4), 521-5

CODEN: JDRSAN; ISSN: 0022-0299

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Open texture, fractures and slits in Cheddar and other cheeses can arise from mech. curd handling practices or the activity of microorganisms producing CO<sub>2</sub> gas, or both. The level of CO<sub>2</sub> in cheese would give a useful indication of the extent of microbiol. activity and thus the relative contributions of microbiol. and mech. causes to open texture. Existing methods of determining CO<sub>2</sub> in cheese are based on extracting relatively large (30-50 g) samples of cheese, and releasing the CO<sub>2</sub> contained in the aqueous exts. into the headspace of an enclosed vessel. The released CO<sub>2</sub> is either trapped in Ba(OH)<sub>2</sub> and back-titrated (Robertson, P. S., 1957, 1962; Hoglund, G. F. et al., 1972), or measured directly in the headspace (Bosset, J. O. et al., 1980, 1989). In the clin. field an enzymic procedure has been used for determining CO<sub>2</sub> in blood serum (Forrester, R. L. et al., 1976). The present report details the adaptation and use of this procedure for the determination of CO<sub>2</sub> in cheese. Cheese (.apprx.5 g) was extracted with NaOH and trapped CO<sub>2</sub> assayed with a 2-step reaction catalyzed by phosphoenolpyruvate carboxylase and malate dehydrogenase. Standard deviations of individual detns. on Cheddar cheese were approx. ±1 mmol CO<sub>2</sub>/kg cheese. The enzymic method is simpler than earlier ones.

L2 ANSWER 12 OF 13 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1990:97474 CAPLUS

DOCUMENT NUMBER: 112:97474

TITLE: Rapid procedure for the determination of soil biological activity

AUTHOR(S): Aristovskaya, T. V.; Chugunova, M. V.

CORPORATE SOURCE: Tsentr. Muzei Rochvoved. im. Dokuchaeva, Leningrad, USSR

SOURCE: Pochvovedenie (1989), (11), 142-7

CODEN: PVDEAZ; ISSN: 0032-180X

DOCUMENT TYPE: Journal

LANGUAGE: Russian

AB A 50-g soil sample was amended with 0.25 g urea in a small amount of water, wetted to paste condition, and spread on the bottom of a 10-cm diameter Petri dish. A pH

indicator strip was attached to the lid of the dish which was covered and incubated. Atmospheric pH in the dish headspace was raised by evolving NH<sub>3</sub> to pH 7.0, 7.5, 8.0, 8.5, 9.0, and 9.5 over 10, 18, 22, 25, 26, and 32 h, resp., above a sample of freshly reclaimed humic-peat-podzolic soil, and the times were the same for all pH values in 3 replicates. In a garden soil of the same type the resp. times were 1.5, 2.7, 3.2, 3.7, 4.2, and 5.5 h. Thus, the rate of NH<sub>3</sub> evolution from the freshly reclaimed soil showed a lag phase which was absent in the garden soil. A pH rise by 1-2 units was adequate to discriminate between the soils compared. The validity of the method was confirmed on samples of chernozem soil under wheat taken at 2.5, 5.0, 10.0, and 20.0 km from a metallurgical plant. The headspace pH increased to 7.5 over 2.00, 1.75, 1.50, and 1.00 h, resp. These results paralleled the results of determination of CO<sub>2</sub> evolution by a standard method; moreover, the headspace pH determination procedure was much simpler than was CO<sub>2</sub> titration

L2 ANSWER 13 OF 13 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1966:511237 CAPLUS

DOCUMENT NUMBER: 65:111237

ORIGINAL REFERENCE NO.: 65:20746c-e

TITLE: Humidity and moisture measurements in relation to storage stability of dehydrated foods

AUTHOR(S): Kapsalis, John G.; Wolf, Max; Driver, Margaret; Henick, Albert S.

CORPORATE SOURCE: Armed Forces Food Container Inst., Chicago

SOURCE: Humidity Moisture, Papers Intern. Smp., Washington, D.C. (1965), 1963(2), 161-72

DOCUMENT TYPE: Journal

LANGUAGE: English

AB cf. CA 63, 13927e. The stability of ground freeze-dehydrated raw beef, precooked freeze-dehydrated shrimp, and precooked freeze-dehydrated spinach was studied in relation to equilibrium relative humidity (R.H.) conditions upon storage at different temps. Deterioration was followed by gas chromatographic analysis of O and CO<sub>2</sub> in the headspace, by spectrophotometric reflectance measurements of the meat pigments, and by final free fatty acid determination made by titration with 0.01N NaOH of a CHCl<sub>3</sub> extract of the sample. Beef samples were stored at 100°F. and at 0, 11, and 32% R.H. for 95 days. O uptake and pigment degradation were only slightly different at 0 and 11% R.H. and much greater at 32%. During storage, the formation of free fatty acids was much higher at 32% R.H. than at 11%, and that at 11% was higher than that at 0% R.H. Freeze-dried shrimp were stored at 100°F. and 0, 11, and 20% R.H. for 105 days. Maximum stability was obtained at 0% R.H., with relatively little deterioration at 11% R.H., and a rapid O uptake was obtained at 20% R.H. Freeze-dried spinach was stored at 120°F. and 2, 12, and 30% R.H. for 67 days; maximum stability was obtained at 2% R.H. 13 references.

L5 ANSWER 13 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1944:25783 CAPLUS

DOCUMENT NUMBER: 38:25783

ORIGINAL REFERENCE NO.: 38:3762f-i

TITLE: Determination of CO<sub>2</sub> in water

AUTHOR(S): McKinney, D. S.; Amorosi, A. M.

SOURCE: Industrial and Engineering Chemistry, Analytical Edition (1944), 16, 315-16

CODEN: IENAAD; ISSN: 0096-4484

DOCUMENT TYPE: Journal

LANGUAGE: Unavailable

AB With the exception of the evolution method, titration methods, especially when used to determination small amts. of CO<sub>2</sub> are defective in one or more of the following: (1) Indicators used to not change color at optimum pH values. (2) Titration is carried out by observing color change, and not to precise pH values. (3) Corrections for the presence of interfering substances are uncertain. The method described overcomes these defects by titrating the sample between two properly selected pH values, acidifying and boiling off the CO<sub>2</sub>, cooling the sample, and retitrating between the same two pH values. The difference between the two titrations gives the CO<sub>2</sub> in the sample. A precision of  $\pm 1$  p. p. m. can be attained. Apparatus readily available is used and no knowledge of the nature or concentration of interfering substances, except sulfides, is required. From a study of the inflection points of calculated titration curves, pH values of 8.5 and 5 were selected for the titrations; pH values of 9 and 5 are slightly better in water containing phosphates. Indicator trials led to the selection of methyl red mixed with o-cresolphthalein. Phenolphthalein can replace the latter. Complete details are included for reagents required, the analytical procedure, correction for interfering substances in the NaOH titrating solution as well as for acid gases other than CO<sub>2</sub>, and calcn. of CO<sub>2</sub>. Because of rapid reduction of the methyl red on boiling, samples containing large quantities of either H<sub>2</sub>S or SO<sub>2</sub> cannot be successfully titrated by the procedure described.

	Hits	Search Text
1	2	("20020061596").PN.
2	5	"carbon dioxide" with alkaline with "pH indicator"
3	169	"carbon dioxide" and alkaline and "pH indicator"
4	33	("carbon dioxide" and alkaline and "pH indicator") and equilibrat\$3
5	293	"carbon dioxide" and (alkaline or NaOH or "sodium hydroxide" or BaCl or "barium chloride") and "pH indicator"
6	2	("carbon dioxide" and (alkaline or NaOH or "sodium hydroxide" or BaCl or "barium chloride") and "pH indicator") and (rate near2 evolution)
7	205	("carbon dioxide" and (alkaline or NaOH or "sodium hydroxide" or BaCl or "barium chloride") and "pH indicator") and rate
8	78	((("carbon dioxide" and (alkaline or NaOH or "sodium hydroxide" or BaCl or "barium chloride") and "pH indicator") and rate) and equilibr\$5
9	32	((("carbon dioxide" and (alkaline or NaOH or "sodium hydroxide" or BaCl or "barium chloride") and "pH indicator") and rate) and equilibr\$5) and shak\$4
10	304	("carbon dioxide" or CO2) and (alkaline or NaOH or "sodium hydroxide" or BaCl or "barium chloride") and "pH indicator"
11	212	((("carbon dioxide" or CO2) and (alkaline or NaOH or "sodium hydroxide" or BaCl or "barium chloride") and "pH indicator") and rate
12	72	((("carbon dioxide" or CO2) and (alkaline or NaOH or "sodium hydroxide" or BaCl or "barium chloride") and "pH indicator") and rate) and shak\$4
13	87	((("carbon dioxide" or CO2) and (alkaline or NaOH or "sodium hydroxide" or BaCl or "barium chloride") and "pH indicator") and shak\$3
14	765	((measur\$6 or defin\$6 or estimat\$6 or evaluat\$6 or determin\$6 or detect\$5 or monitor\$4) near3 ("carbon dioxide" or CO2)) and equilibrat\$4
15	116	(( ((measur\$6 or defin\$6 or estimat\$6 or evaluat\$6 or determin\$6 or detect\$5 or monitor\$4) near3 ("carbon dioxide" or CO2)) and equilibrat\$4) and shak\$4



	Hits	Search Text
16	81	(( ((measur\$6 or defin\$6 or estimat\$6 or evaluat\$6 or determin\$6 or detect\$5 or monitor\$4) near3 ("carbon dioxide" or CO2)) and equilibrat\$4) and shak\$4) and ("pH indicator" or color\$4)
17	271	(( ((measur\$6 or defin\$6 or estimat\$6 or evaluat\$6 or determin\$6 or detect\$5 or monitor\$4) near3 ("carbon dioxide" or CO2)) and equilibrat\$4) and ("pH indicator" or color\$4)
18	267	(( ((measur\$6 or defin\$6 or estimat\$6 or evaluat\$6 or determin\$6 or detect\$5 or monitor\$4) near3 ("carbon dioxide" or CO2)) and equilibrat\$4) and ("pH indicator" or color\$4)) and (liquid or solution)
19	79	("carbon dioxide" or CO2) with "pH indicator"
20	1231	("carbon dioxide" or CO2) with ("pH indicator" or colorimetr\$4 or color\$4)
21	923	((("carbon dioxide" or CO2) with ("pH indicator" or colorimetr\$4 or color\$4)) and (liquid or solution)
22	158	((("carbon dioxide" or CO2) with ("pH indicator" or colorimetr\$4 or color\$4)) and (liquid or solution)) and equilibr\$4
23	56	(((((("carbon dioxide" or CO2) with ("pH indicator" or colorimetr\$4 or color\$4)) and (liquid or solution)) and equilibr\$4) and (shak\$4 or agitat\$4)
24	543	("carbon dioxide" or CO2) with (liquid or solution\$2) with equilibr\$5
25	2	((("carbon dioxide" or CO2) with (liquid or solution\$2) with equilibr\$5) with ("pH indicator" or colorimetr\$4)
26	15	((("carbon dioxide" or CO2) with (liquid or solution\$2) with equilibr\$5) and ("pH indicator" or colorimetr\$4)
27	101	("carbon dioxide" or CO2) and headspace and (evolut\$4 or respir\$4) and equilibr\$4
28	3	((("carbon dioxide" or CO2) and headspace and (evolut\$4 or respir\$4) and equilibr\$4) and colorimetr\$4
29	73	((("carbon dioxide" or CO2) and headspace and (evolut\$4 or respir\$4) and equilibr\$4) and (colorimetr\$4 or "pH indicator" or color\$3 or sodium)
30	101	("carbon dioxide" or CO2) and headspace and titrat\$4

	Hits	Search Text
31	0	("carbon dioxide" or CO2) with (dynamic near2 titrat\$4)
32	207	("carbon dioxide" or CO2) with titrat\$4
33	3	((("carbon dioxide" or CO2) with titrat\$4) and headspace
34	101	("carbon dioxide" or CO2) and titrat\$4 and headspace
35	12	((("carbon dioxide" or CO2) and titrat\$4 and headspace ) and (colorim\$4 or colour\$4 or "pH indicator"))
36	0	((("carbon dioxide" or CO2) and titrat\$4 and headspace ) and NaOH and BaCl2
37	50	((("carbon dioxide" or CO2) and titrat\$4 and headspace ) and (NaOH or alkaline)
38	17	((("carbon dioxide" or CO2) and titrat\$4 and headspace ) and (NaOH or alkaline)) and equilibrat\$4
39	2012	((("carbon dioxide" or CO2) with (evolut\$4 or respir\$4 or flux)) and (alkaline or NaOH or "sodium hydroxide"))
40	52	((("carbon dioxide" or CO2) with (evolut\$4 or respir\$4 or flux)) with (alkaline or NaOH or "sodium hydroxide"))
41	535	(436/133,145,146).CCLS.
42	274	("carbon dioxide" or CO2) and ((436/133,145,146).CCLS.)
43	34	((("carbon dioxide" or CO2) and ((436/133,145,146).CCLS.)) and alkalin\$3
44	15	((("carbon dioxide" or CO2) and ((436/133,145,146).CCLS.)) and alkalin\$3) and equilibr\$5
45	2	("4728499").PN.

	Hits	Search Text
46	1330	(436/20,25,34,51,163,167,168).CCLS.
47	175	((436/20,25,34,51,163,167,168).CCLS.) and ("carbon dioxide" or CO2)